Integrating Scientific Research: Theory and Design of Discovering Similar Constructs

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ABSTRACT

Assessing the similarity of proposed theoretical constructs to each other and those previously known and studied is imperative in theoretical research. In this paper we turn to theories of similarity judgement from cognitive psychology for the understanding of the process of establishing similarity between one or more constructs. Then, guided by these theories, we develop an integrated method for automatic detection of similar constructs. We apply the method to constructs from leading IS journals, a major journal in psychology, and the interdisciplinary overlap between the IS and psychology constructs. Our paper contributes to methodology of research, design science research, behavioral IS research, text mining and information retrieval theory and practice, IS research on ontology alignment and schema matching as well as cognitive theories of similarity in psychology.

Keywords

Construct Similarity, Information Integration, Cognitive Similarity, Cognitive Psychology, Nomological Net, Schema Matching.

INTRODUCTION

Research on information integration is typically viewed in the context of information systems (IS) development or IS use. Major streams of information integration research includes ontology alignment and database schema mapping (Doan & Halevy, 2005; J. Evermann, 2008b; Rahm & Bernstein, 2001; Sekhavat & Parsons, 2012) as well as search and retrieval (Ingwersen & Järvelin, 2006; Passant, 2007).

Recently, IS community begins to encourage the application of theories and methods born in the IS context to other scientific disciplines (Beath, Berente, Gallivan, & Lyytinen, 2013; Goes, 2013). Thus, Parsons and Wand (2012) applied classification principles to the context of scientific knowledge representation. We follow this example to extend findings originally considered in the context of information integration to the problem of integrating scientific body of knowledge.

Motivated by these efforts, in this early research effort, we employ theories of cognitive similarity that showed promise in IS ontology alignment and schema matching research to develop a framework for understanding the process of establishing similarity between one or more scientific constructs.

A *scientific construct* is "a conceptual term used to describe a phenomenon of theoretical interest that cannot be observed directly" (Hinkin, 2005, p. 162). It could be a psychological construct (representing mental states) or a social one (representing collective intentionality) (Searle, 1995). To illustrate, consider an example of a psychological construct, emotional trust, "defined as the extent to which one feels secure and comfortable about relying on the trustee" (Komiak & Benbasat, 2006, p. 943). An example of a social construct is corporate social responsibility that can be defined as "actions that appear to further some social good, beyond the interests of the firm and that which is required by law" (El Ghoul, Guedhami, Kwok, & Mishra, 2011, p. 2388; McWilliams & Siegel, 2001, p. 117). In both cases, identification of similar constructs is required for literature review, to establish contribution novelty, to build a nomological network, and to argue for the application of research findings beyond a specific research context. Indeed, identification of similar (or related) constructs may suggest additional antecedents and outcomes of the construct of interest, and thus can enrich the researcher's theory. Theoretical constructs are considered "building blocks of science" (Osigweh, 1989, p. 591). Yet we continue to lack theoretical understanding of how similar constructs are determined. This process is also highly contingent on the knowledge, diligence and expertise of the researcher, with little tool support for doing this.